COOPERATIVE HUNTSVILLE-AREA RAINFALL MEASUREMENTS (CHARM) NETWORK

Volunteer-based precipitation network – est. by NASA in 1/2001

- Government (NWS ASOS and Cooperative observer, Army) - 6
- USGS (rainfall and stream flow – automated) - 13
- employees of NSSTC/GHCC –50
- schools - 6
- enthusiasts (10 year olds to Ph.D.s) - 21

Supports local weather and climate research at the GHCC

- validate weather radar, lightning data, and microwave measurements from satellites
- monitor spatial distributions of precipitation for modeling activities
- various satellite remote sensing studies
- outreach – involves community in a NASA project

PAST USE AND APPLICATIONS

- **CHARM86 –** supported NASA meteorological experiment over Huntsville

- **Existing measurements systems**

  Aldridge Creek flood of 1999

  Flooding of the AXAF clean room out at MSFC (1997)

  Environmental studies for MSFC Redstone Arsenal

CHARM NETWORK – GAUGE OWNERSHIP

NASA
- 4” non-recording - 41
- 8” recording – 2

ARMY - 1

Private
- individual - 27
- AWIS - 2

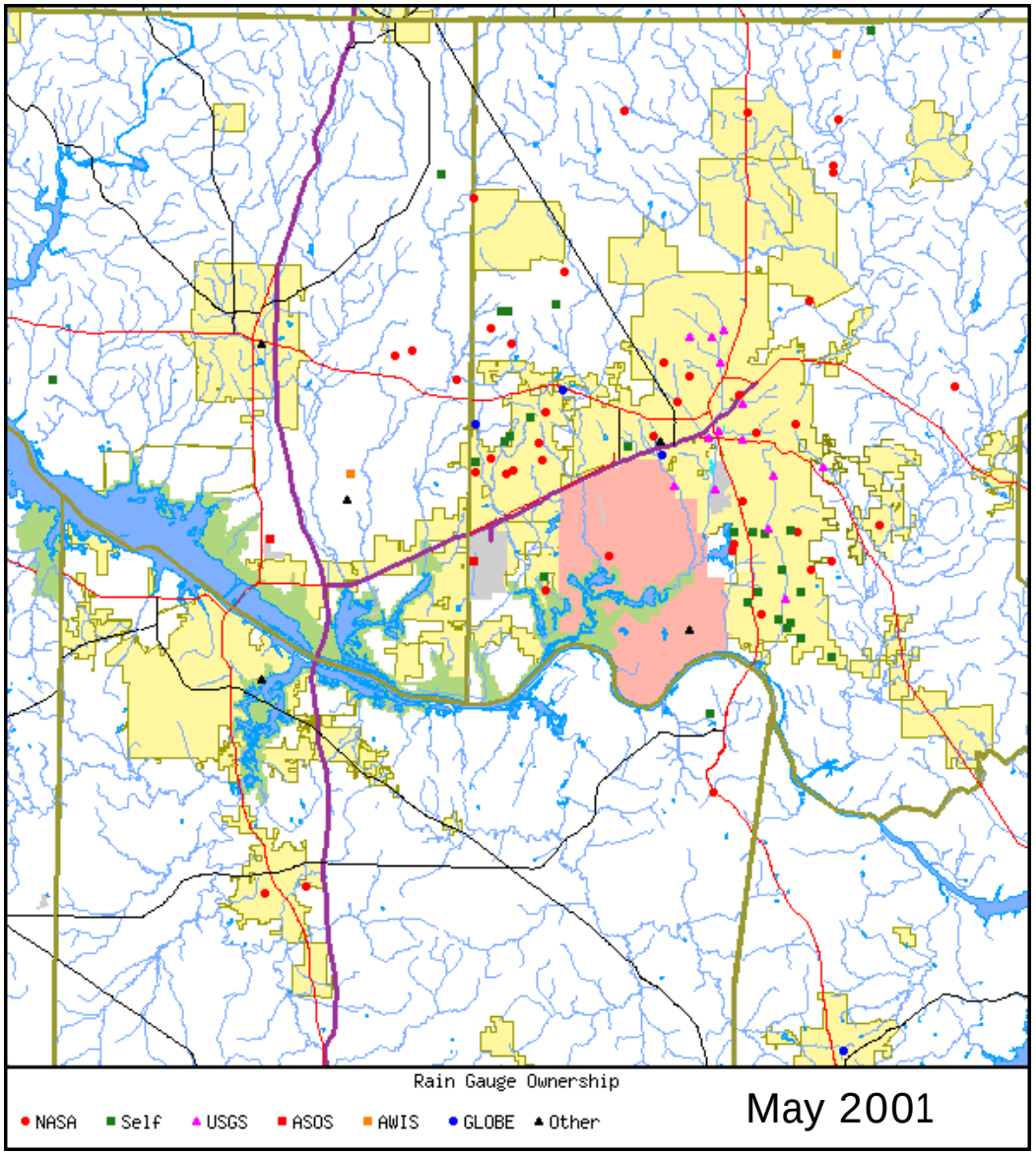
USGS - 13

GLOBE – 4

NWS
- AS0S – automated - 2
- Coop – 3

Other – 1 (UAH 8” recording)

Total – 96
- manual 76
- recording 3
- automated 17

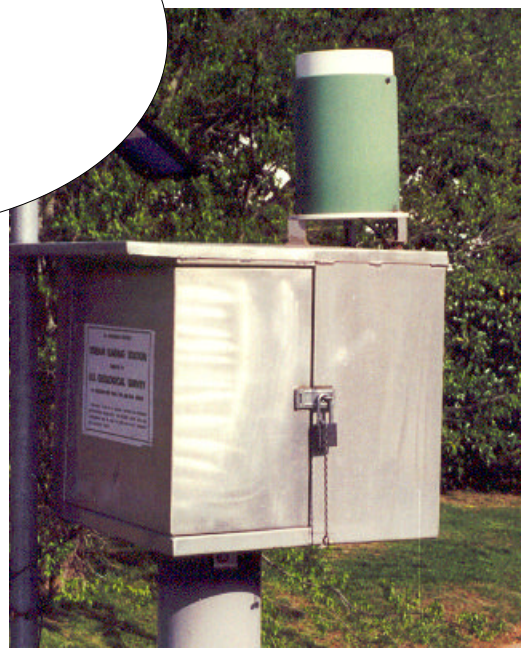


TYPES OF RAIN GAUGES USED IN CHARM

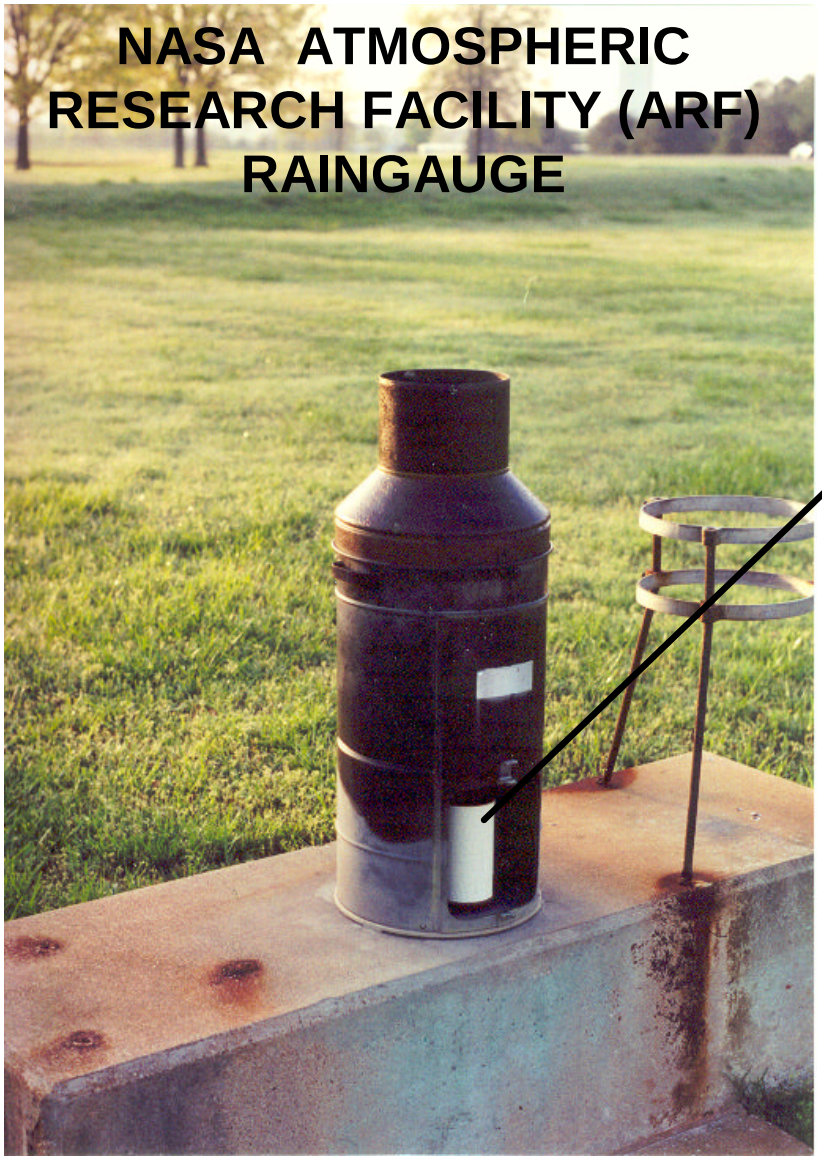
4” non-recording “all-weather” plastic

6”, 8” non-recording (metal)

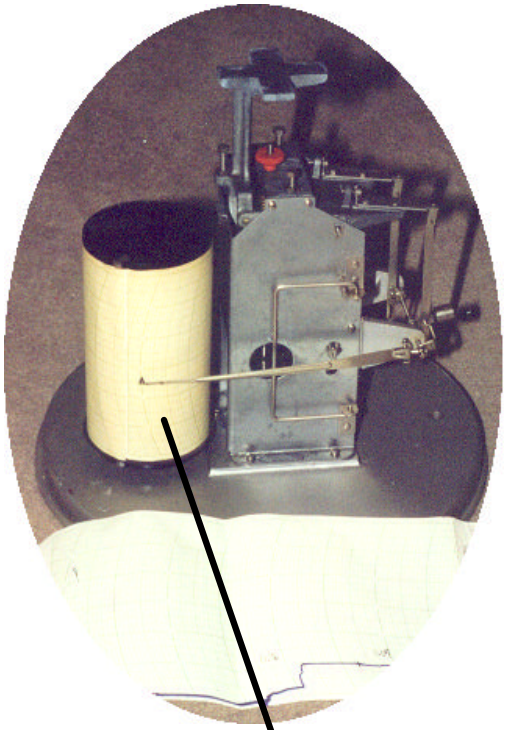
6”, 8” tipping bucket – recorded electronically



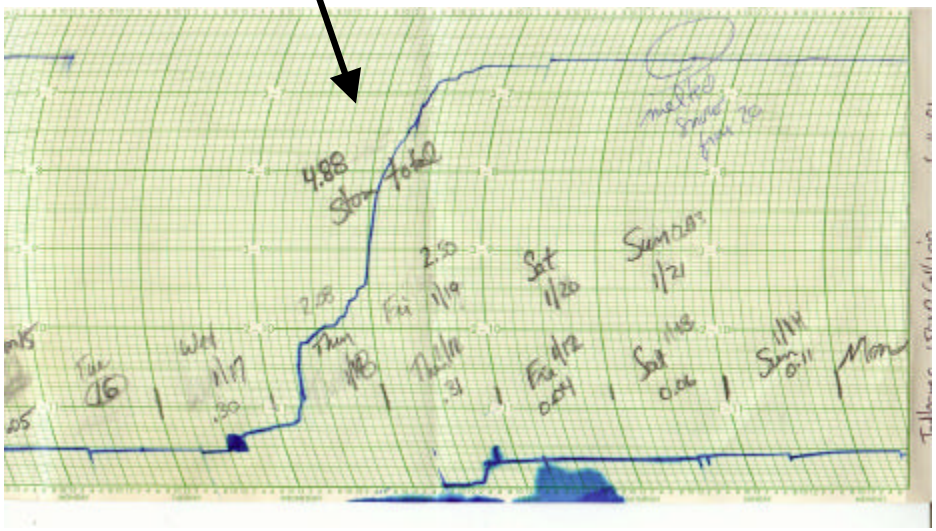
6”, 8” recording weekly paper charts



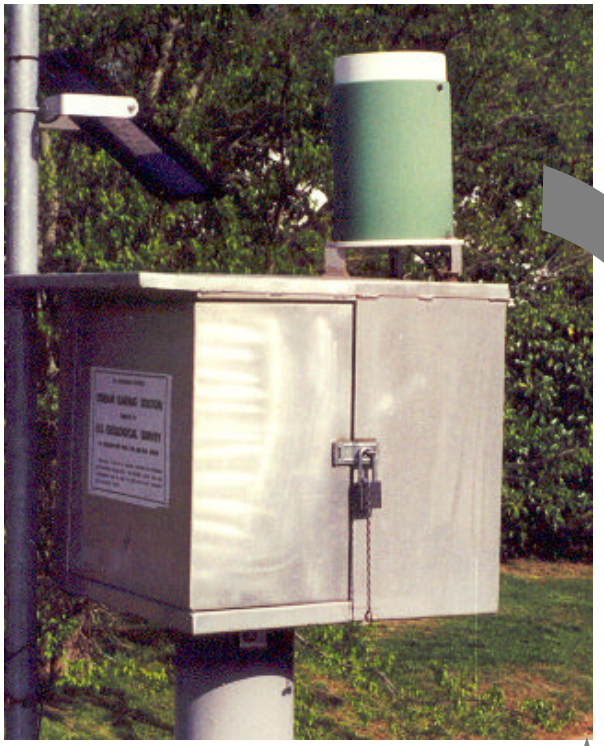
8” recording gauge at the NASA - ARF
(vintage 1940’s)

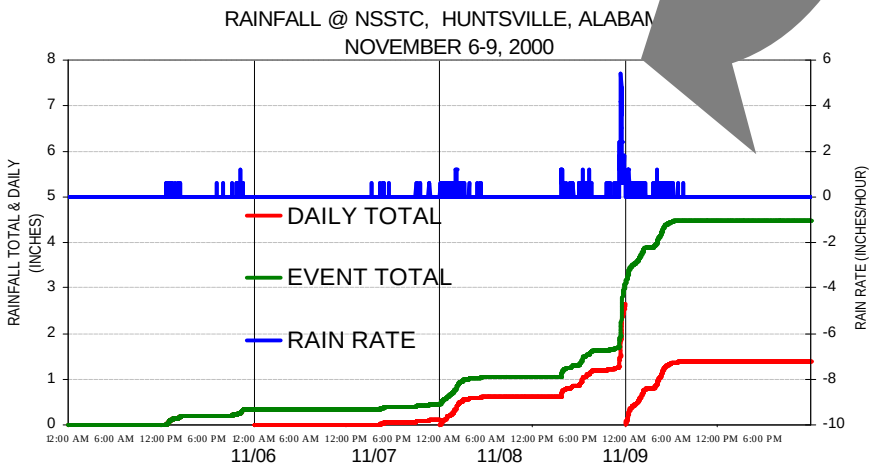


scale and
recording chart

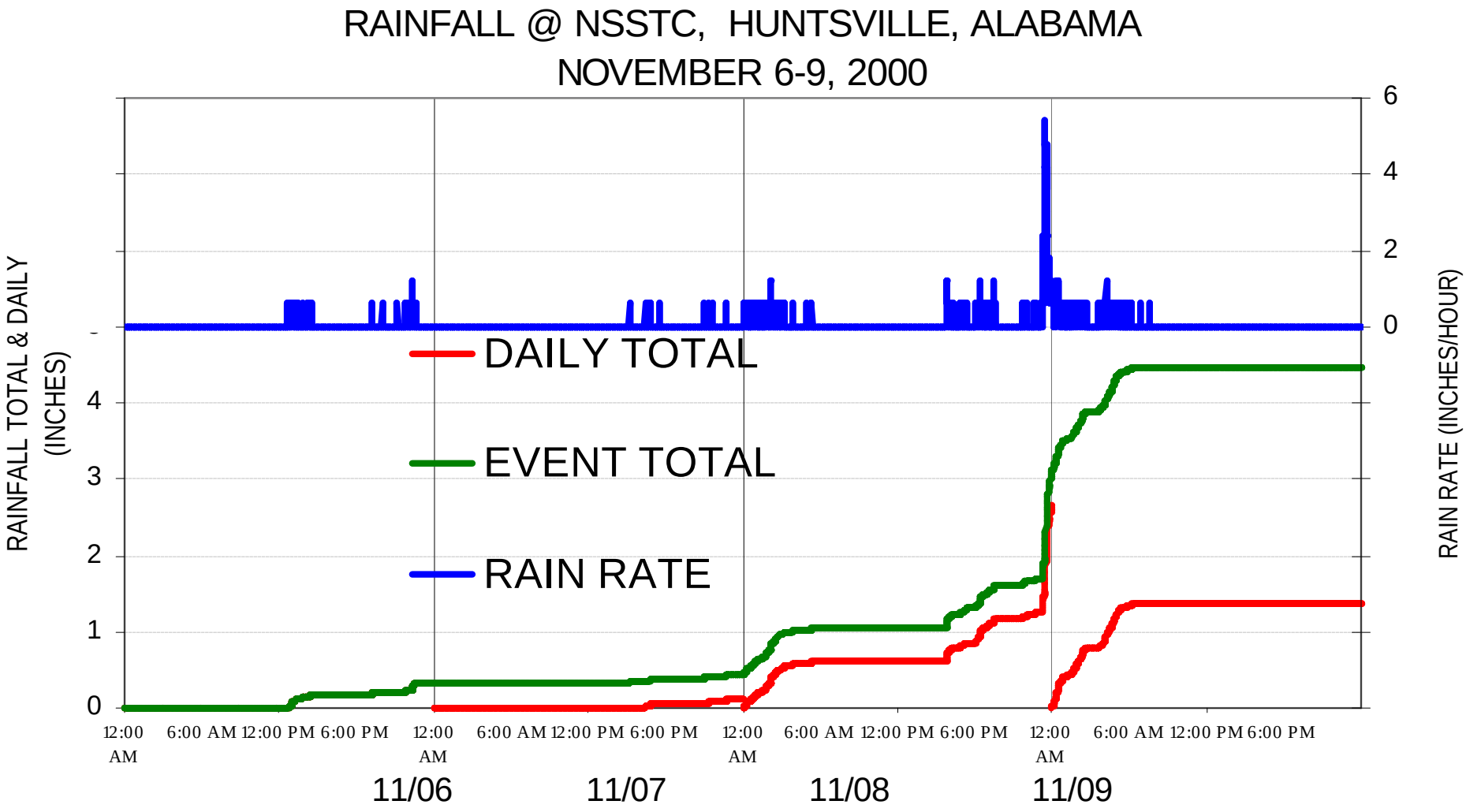


USGS RAIN GAUGE AND STREAM FLOW METER





NSSTC TIPPING BUCKET RECORD



RAIN GAUGE EXPOSURE

Away from trees and houses which can affect collection and accumulation of rain / snow

Eye level for easy reading

Open field away from trees and house

Typical home exposure

HOW TO MAKE CHARM MEASUREMENTS

Take daily measurements, preferably at 1200 UTC (6:00am LST or 7:00am DST). Or read it when you can noting beginning/ ending time.

Rain measurements are for the previous 24 hours. So, rain that occurred on the afternoon of the 11th of February for instance would be reported for the period of the 11th at 6 am through the 12th at 6 am.

Enter rainfall data into CHARM database – daily if possible

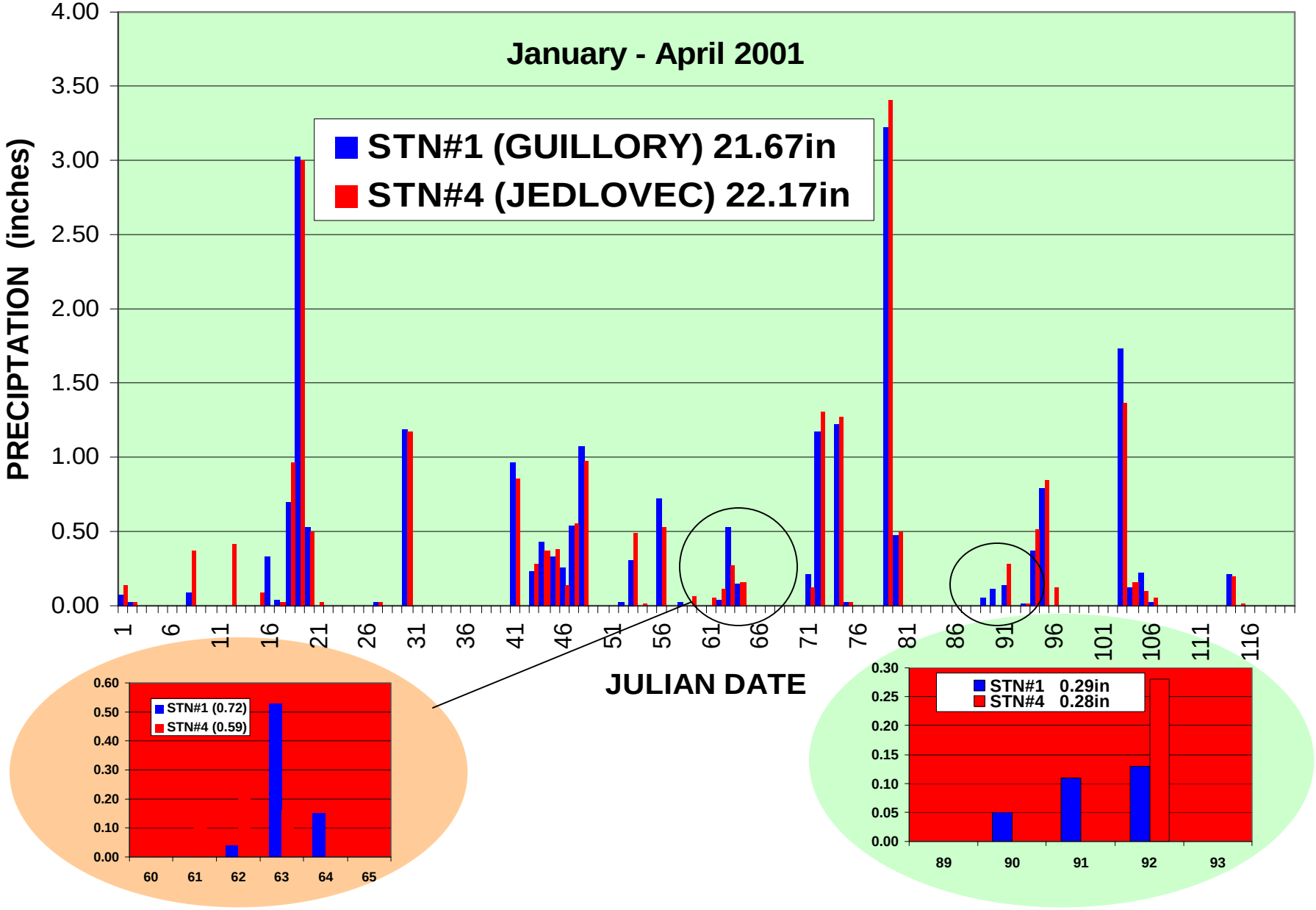
Keep a hardcopy of your rain records. Either on a calendar, or sheet of paper. You might even keep this is your own spreadsheet.

Do not leave rainwater freeze in the inner cylinder of the 4" plastic rain gauges. They will shatter. In cold (potentially freezing) weather, the inner tube and funnel may be removed and rain/snow can be collected in the outer tube. Use inner tube to measure collected rain.

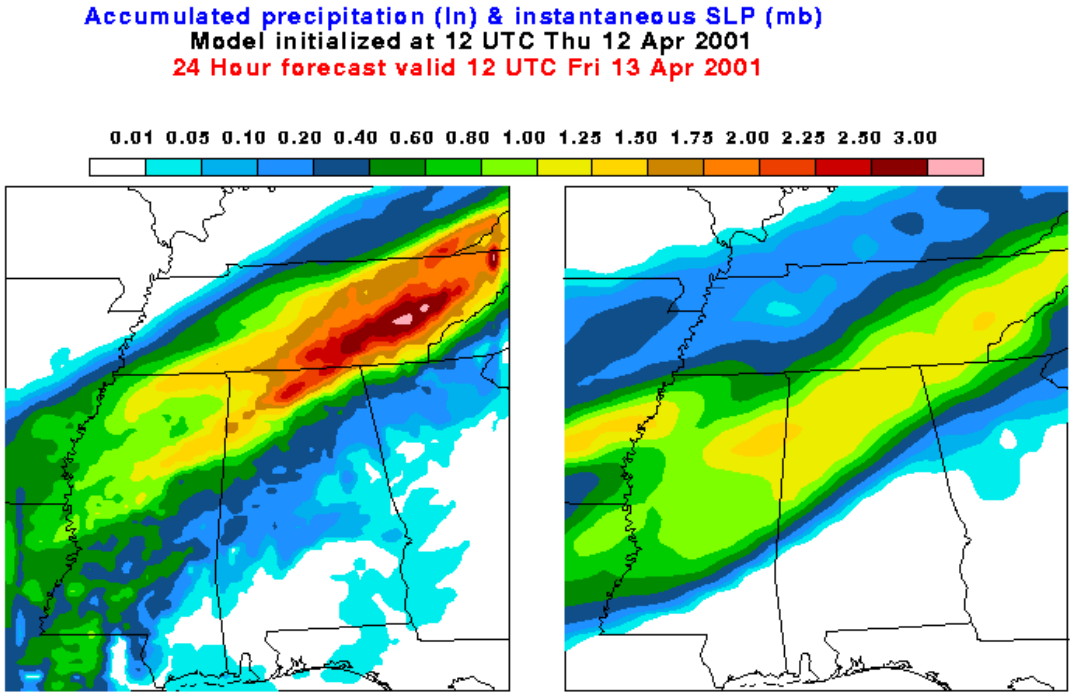
Collected snow should be allowed to melt, measured, and reported as "water equivalent."

Use comment section on CHARM data entry to note abnormal events (e.g., "it rained but I spilled some while I was measuring", or "1 in of snow, 0.09 water equivalent", etc.)

DAILY PRECIPITATION RECORDS



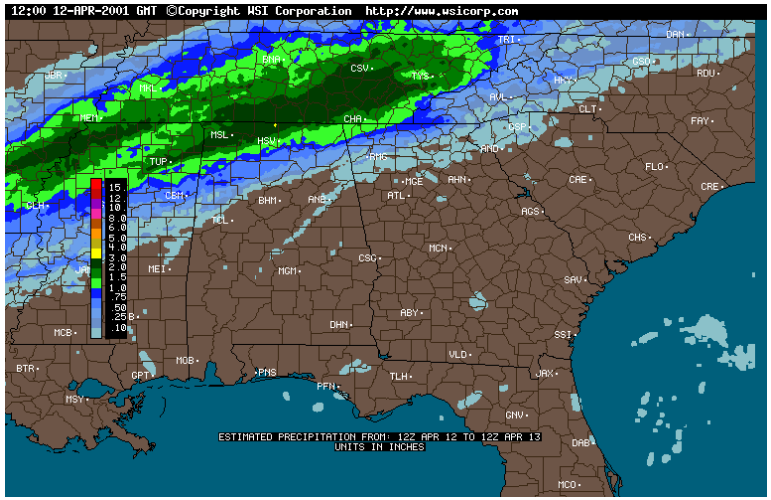
PRECIPITATION INTERCOMPARISON



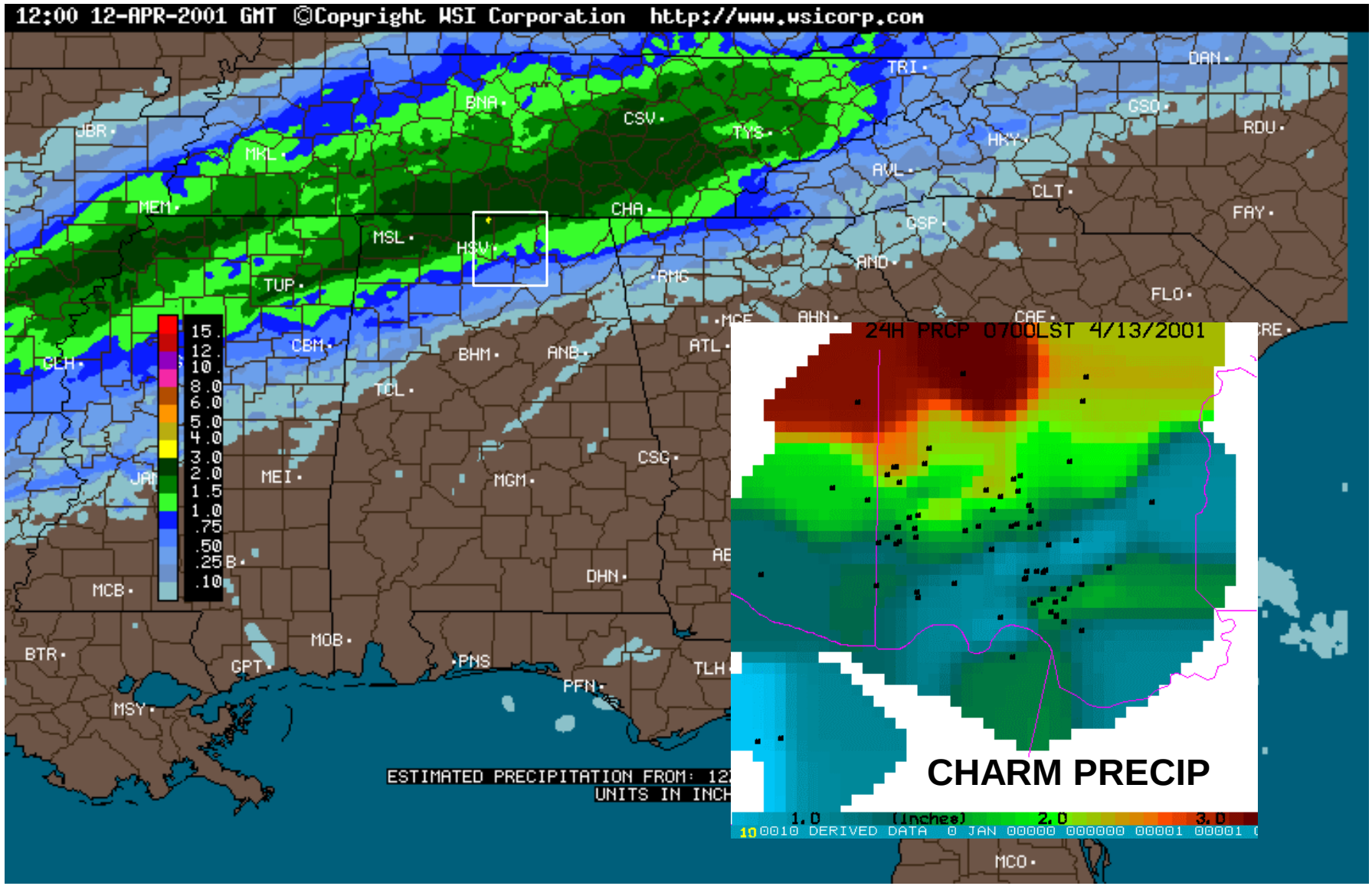
Forecast: 24h accumulated rainfall for April 12-13, 2001, 0700 LDT.

Regional MM5 model (left) and early Eta (right)

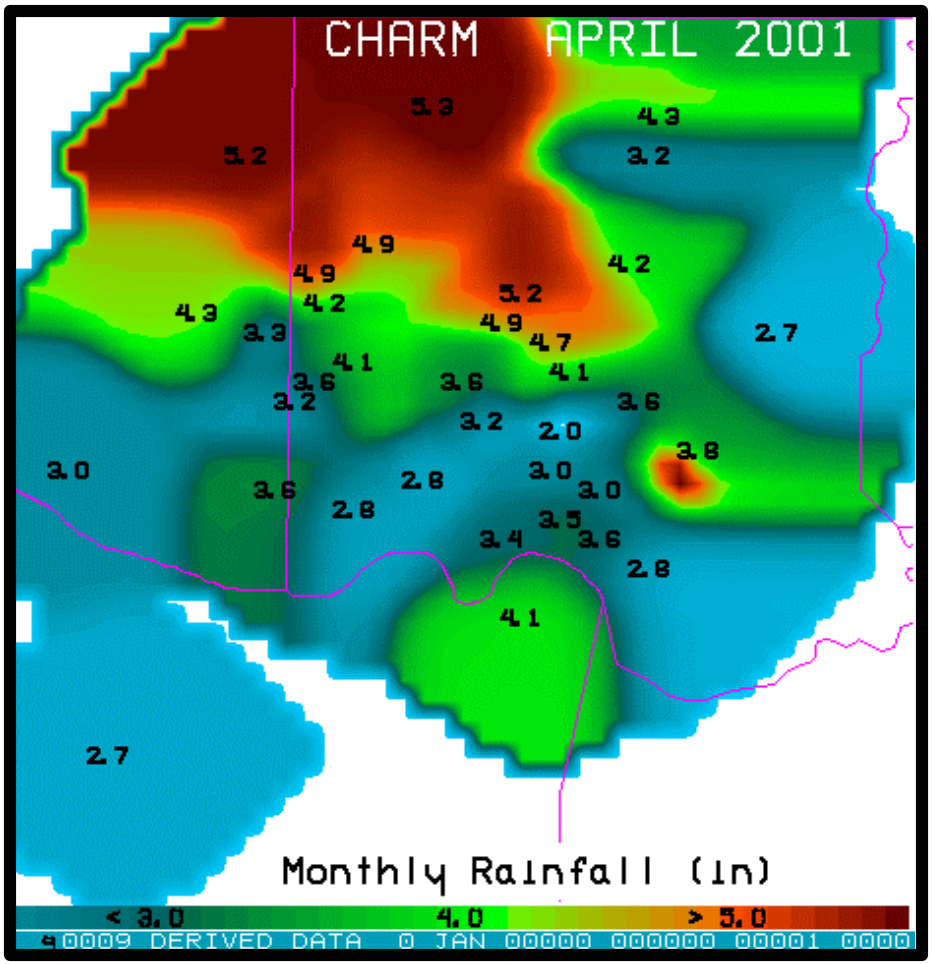
Validation: 24h accumulated rainfall derived from NWS radars, April 12-13, 2001, ending 7:00a LST.



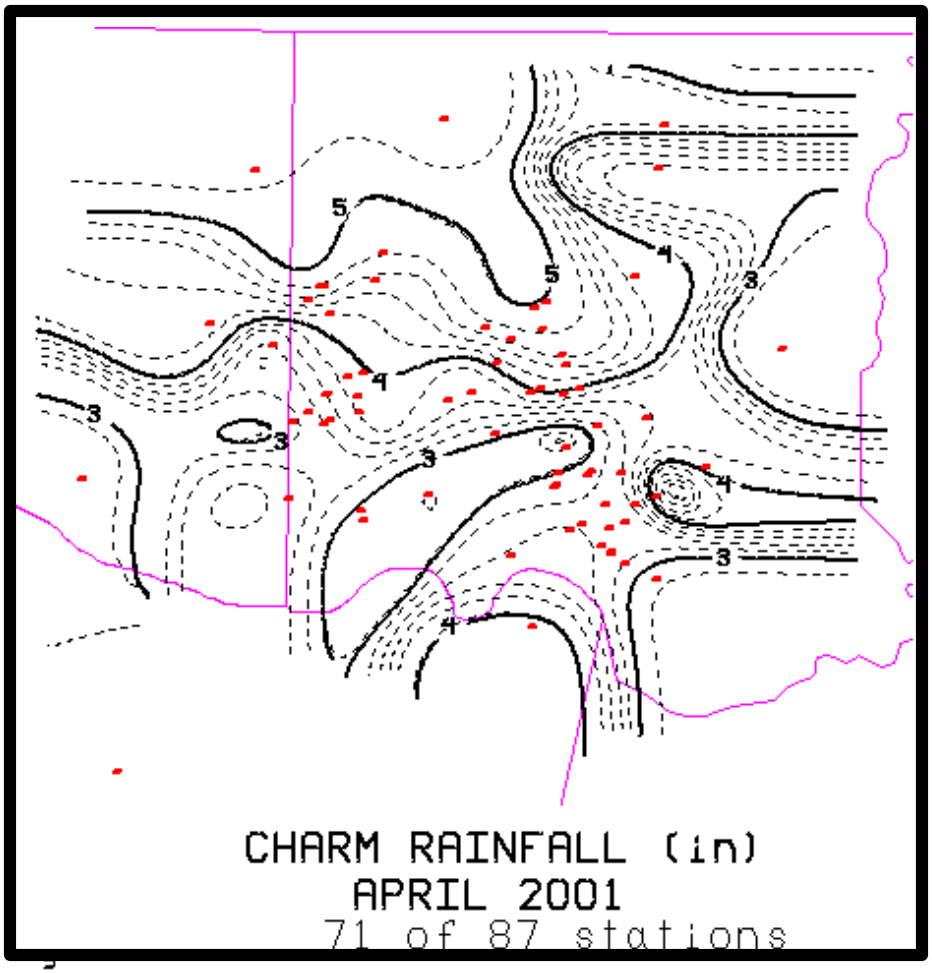
PRECIPITATION ESTIMATE FROM RADAR



CHARM – APRIL 2001



Spatial distribution of monthly totals (blue (low) to red (high) monthly values).
Not all stations are plotted.
Max: 5.65 (#53) : Min: 2.03 (#21)
Max/min separated by about 10km.



McIDAS analysis of CHARM data.
Solid - 1.0in intervals
Dashed – 0.2in intervals
71 stations with complete data records (red dashes).

CHARM – MAY 8, 2001

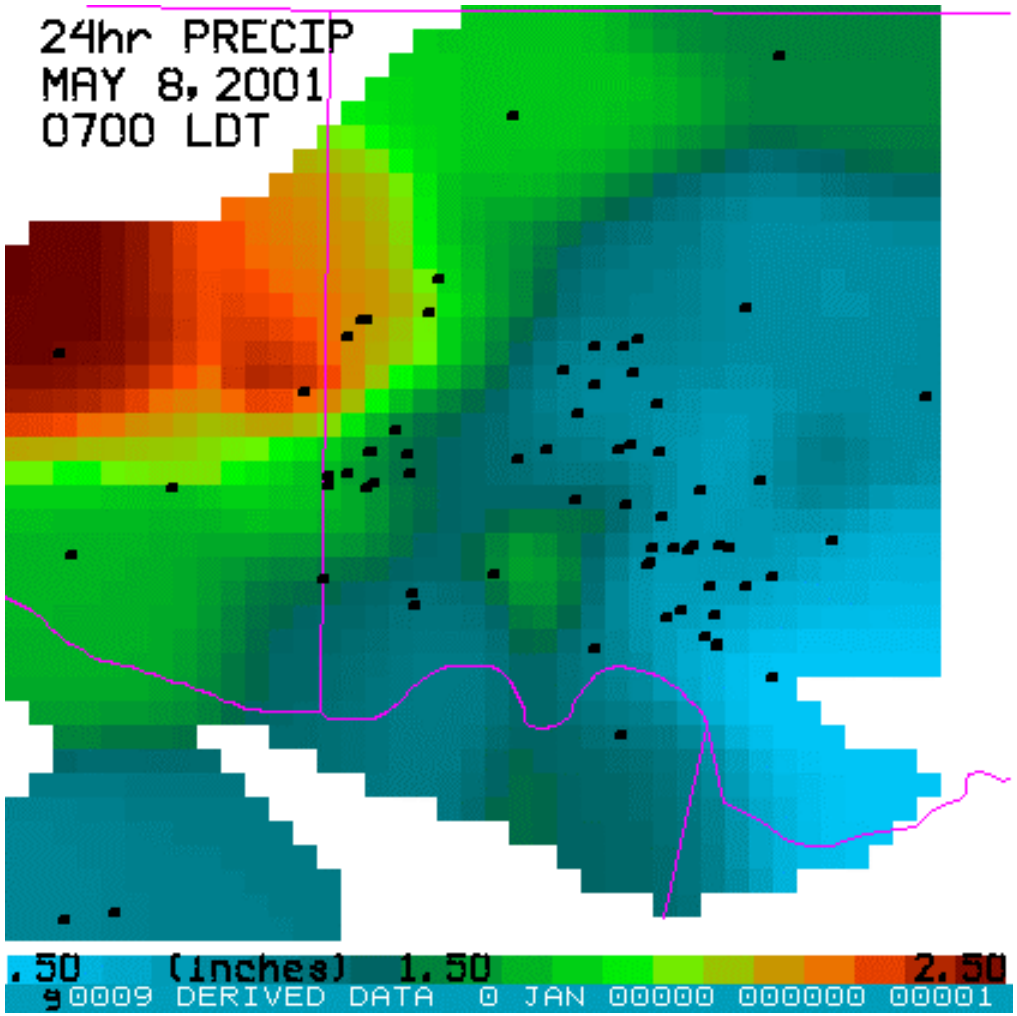
<u>24 Hour Totals</u>

Max: 2.69in (Athens Coop)

Min: 0.61in (Jedlovec)

NASA (ARF): 1.75in

Unofficial reports >4.00in just NW of CHARM network



THE FUTURE OF CHARM

Long-term activity to support NASA research projects

- permanent (?) to support Tennessee Valley weather resources
- possible field program or GPM validation site

Expand network

- outlying areas – fill in gaps (N. Madison Co, south of River, east of HSV)
  - more schools (?), fire stations, weather enthusiasts
- more recording gauges – including some complete weather stations for pressure, temperature, humidity, winds, and rainfall
- annual CHARM meeting of all participants
  - workshop on equipment and observation methods, scientific analysis
  - picnic or other gathering to share experiences

STRIP CHART FROM CHARM SITE (JEDLOVEC)
Jan 11-21, 2001